

## RTD06 Agricultural intensification as a major threat to bird biodiversity

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### 1 Issues

Current predictions (Tilman et al., 2001) suggest that around a billion hectares of new land will be placed under cultivation in the developing world in the next 50 years. That area roughly equals the earth's total area of rainforest. In contrast, 100 million hectares of currently farmed land in the developed world is likely to fall out of production. Both the spread and the loss of farmland can impact severely on bird populations. Moreover, new agricultural technologies, such as genetic modification, may also affect wildlife in various ways. So this RTD aimed to discuss research relating to such effects and to identify priority areas for attention.

The RTD began with several presentations. The first outlined the scale of the threat posed by crop production systems to bird populations around the world, using as examples the intensification of European arable agriculture and tropical coffee and cocoa systems. In the former, declines of farmland birds have been greatest in countries with the most intensive agriculture (Donald et al., 2001), a trend currently regarded as the greatest single threat to Europe's bird populations. Tropical crop systems, moreover, can have a disproportional effect on biodiversity because their centers overlap closely those of earth's biodiversity hotspots. For example, oil palm *Elaeis guineensis* production, which expanded from 250 000 ha. in 1970 to 5 million ha. in 2001, represents one of the main causes of tropical forest loss in southeast East Asia. Increasing demand for agricultural products will be met through two different strategies: intensifying production on land already given over to cultivation, or expanding production into new areas. The choice of which system to use will have different environmental impacts in different parts of the world. In Europe and North America, where a high proportion of wildlife resources remain on farmland, it might be better to maintain or expand existing farmland while keeping intensity of production low. In tropical countries, on the other hand, it is often preferable to intensify existing production systems without expanding into pristine habitats of high nature conservation value.

Three further presentations detailed the effects of intensification in particular production systems. The relationship between skylark *Alauda arvensis* populations in the UK and the intensification of cereal production systems illustrates the subtlety of the impacts. One of the causes for the decline of skylarks in Europe is the greater height and density of cereal crops today, forcing later-breeding birds to nest in areas more vulnerable to predation. The effects on bird populations of intensifying coffee *Coffea arabica* systems in Mexico and central America were also examined. These studies concluded that, although lower intensity systems kept a façade of natural forest and held high bird diversity, particularly of neotropical migrants, even the lowest of them remained unattractive to, or unusable by, species adapted to pristine forest.

### 2 Outcomes

Group discussion centered on a number of questions relating to future research needs for assessing the impacts of agriculture. The following priorities were suggested:

- rice production systems in Asia
- water abstraction for agriculture in Australia
- genetically modified (GM) crops globally
- agrochemicals, particularly in the developing world
- interactions between agriculture and climate change
- relative impacts of clearing versus intensification
- sociological factors — the attitudes of farmers towards wildlife
- identification of key agricultural systems and areas in conservation
- improved interdisciplinary collaboration
- environmental services for low intensity agriculture
- identification of mechanisms that drive population changes in farmland birds

The need to understand more about the environmental effects of transgenic crops was stressed repeatedly. Further research might identify such crops as environmentally beneficial, in that they might reduce the need for pesticides and could increase yields, so averting habitat loss

elsewhere. Or they could prove environmentally damaging, reducing non-crop food supplies for wildlife and tying farmers into particular production systems. The introduction of transgenic crops in the USA has led to a decrease in the total area farmed, presenting conservationists with opportunities, so far little explored, to consider what should replace farmland.

The RTD recognized that, in order to advise and influence global agriculture and biodiversity issues, conservation scientists and advocates must:

- adopt a perspective that is as global as agriculture
- appreciate and address the needs of people, particularly in developing countries.
- develop a better understanding of the economic issues in national and international agricultural trade
- adopt a more multidisciplinary approach to research, because agriculture is a multidisciplinary industry
- identify areas where agriculture is likely to be or become a serious threat to wildlife populations, and to develop conservation priorities
- develop a strategy that blends pragmatism with a vision of sustainable development

Participants recommended that the International Ornithological Committee should adopt the following resolution recognizing the importance of agriculture as a driving force in bird conservation. The draft resolution reads:

#### **Agricultural production as a major threat to bird populations globally**

The International Ornithological Committee recognizes that major changes are taking place in global agriculture, with consequent threats to, and opportunities for, the con-

servation of biodiversity. These changes may affect agricultural systems directly, and all related ecosystems indirectly, e.g. the abstraction or eutrophication of water and the environmental impacts of burning. Birds are an important, valued and conspicuous element of biodiversity in all habitats, with regard to which recent research has identified causal links between shifts in global agriculture and severe declines in bird populations.

The International Ornithological Committee therefore urges all responsible authorities to support research into the effects of agricultural change on biodiversity in general, and birds in particular, especially in developing countries with high biodiversity. It also urges conservation scientists to participate in multidisciplinary research to devise innovative approaches that capitalize on the opportunities and minimize the threats to biodiversity conservation. Management efforts should be focussed at the broad landscape scale of catchments or regions. They should involve all stakeholders and consider both socio-economic and biological issues. High priority should be given to understanding and managing new agricultural processes that may influence biodiversity values of global significance, regardless of whether they reside in farmland itself or associated ecosystems.

#### **References**

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- Tilman D, Fargione J, Wolff B, D'Antonio C, Dobson A, Howarth R, Schindler D, Schlesinger WH, Simberloff D, Swackhamer D, 2001. Forecasting agriculturally driven global environment change. *Science* 292: 281–284.